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Liberian Strepsiptera in the Smithsonian Collection with Descriptions of Seven New Myrmecolicidae[1]

By Jean Walker Fox[2]

The Strepsiptera taken in a light trap by Dr. C. C. Blickenstaff in Suakoko, Liberia, February 1952, were submitted to me at the Carnegie Museum (CM) for identification by Mr. O. L. Cartwright, Curator, Division of Coleoptera, United States National Museum (USNM). I owe him thanks for the opportunity to study this interesting collection. The 29 specimens are all Myrmecolicidae, including 7 new and 1 previously known species.

Since this material had been stored in alcohol in a small vial for about 14 years, it proved somewhat difficult to mount on slides satisfactorily. I take this opportunity to urge those who collect Strepsiptera to add a small amount of glycerin to the alcohol and to avoid putting cotton in the vials. Before being mounted, all the material was examined under magnification ranging from × 10 to × 80. Some of the measurements and characters used in the following descriptions were observed in fluid but did not show up clearly after

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mounting. Wing expanse is frequently estimated by doubling the measured width of one wing taken from base of median vein to apex and adding the width of the body between.

Slides were examined with a Wild M20 compound microscope having × 10 oculars and × 3, × 10, and × 20 objectives and a camera lucida attachment, invaluable for accurate drawings.

I wish to acknowledge the patient, professional advice my husband Dr. Richard M. Fox has given me throughout this study as well as his assistance in making some of the slides and drawings. My appreciation also goes to Richard T. Satterwhite, our staff artist, who perfected the drawings for publication, and to Joseph Y. Quil, who typed the final manuscript.

MYRMECOLICIDAE Saunders 1872

Since Bohart's (1951) excellent revision of the Myrmecolicidae, which added 10 new species to the 7 previously known, the family has continued to grow and now comprises 42 species. Of these, Luna de Carvalho (1956, 1959) described 16 from Angola, Oliveira and Kogan (1959) added 4 from Brazil, Kogan and Oliveira (1964) added 3 from New Guinea, Pasteels (1956) added 1 from the Belgian Congo, and Paulian (1959) added 1 from Madagascar. Luna de Carvalho synonomized Bohart's genus *Rhipidcolax* with *Caenocholax* Pierce, which he separated into the *fenyesi* group and the *retrorsus* group. Other recent authors have adopted this classification, recognizing that the detached veins regarded as diagnostic by Bohart actually vary in size, shape, and even visibility with the result that it is difficult to consider them consistent characters.

Myrmecolax blickenstaffi, new species

FIGURES 1–6

Male: Body dark brown, 1.7 mm long; median breadth of hindwing 1.6 mm; wingspread 3.3 mm.

Head: Antenna with segment IV very small and flabellum of III extending about one-third length of segment VII; ratio of VI to VII about 3:5; total length 1.1 mm. Four ocelli seen on inner rim of eye from dorsal view. Mouthparts with slender, lancelike mandibles slightly more than one-half as long as distal segment of maxillary palpus. Palpus and antennal segments III to VII covered with minute hairs and sensoria.

Metathorax: With clearly defined sutures around keystone-shaped prescutum and concave scutellum. Scuti not well defined on inner margins. Postlumbium ovoid with strong anterior rounding. Postscutellum slightly longer than anterior sclerites of metathorax.

Hindwing: With 6 main veins, seen clearly in fluid inspection, and barely distinguishable detached vein between R and M; M_1 about one-fourth length of M_2.

Hindleg: Femur not distinguishable, tibia slender, first subsegment of tarsus much shorter than terminal three.

Aedeagus: With thick base narrowing to single apical hook that has a slight projection on dorsal side.

Abdominal segment x: Almost square.

Female, larva, and host unknown.

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69561.

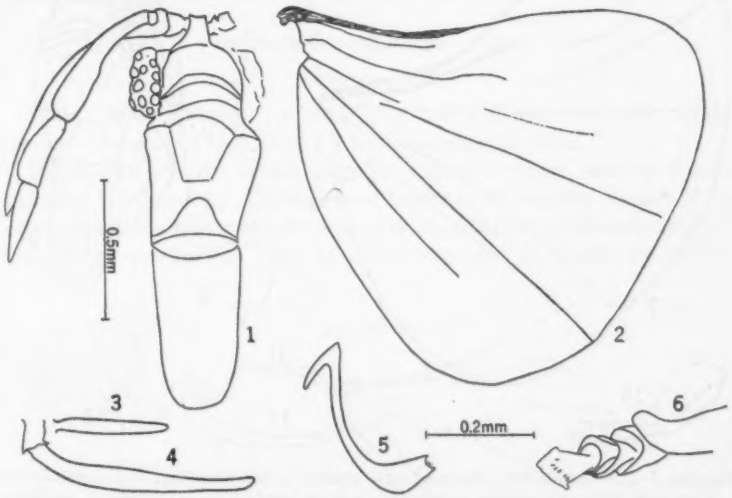


FIGURE 1–6.—*Myrmecolax blickenstaffi*, new species: 1, body and antenna in dorsal aspect; 2, right hindwing; 3, mandible; 4, maxillary palpus; 5, aedeagus, lateral view; 6, hindleg, showing tarsus and part of tibia. (Figs. 3–6 use 0.2 mm scale.)

Discussion: *M. blickenstaffi* can be distinguished easily from other African species of *Myrmecolax* by venation, having only a single, indistinct detached vein instead of two clear ones. In this respect, it is more similar to the species described by Luna de Carvalho under *Caenocholax* Pierce, but the shape of the aedeagus is distinctively different as is that of abdominal segment x.

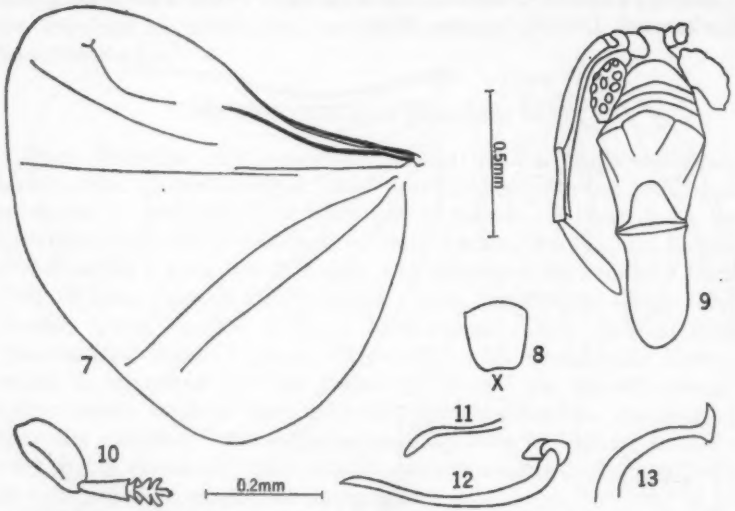
Myrmecolax liberiensis, new species

FIGURES 7–13

Male: Body dark brown, 1.4 mm long; median breadth of hindwing 1.4 mm; wingspread 3.2 mm.

Head: Antenna with flabellum of segment III reaching about to tip of VI with total length (1.2 mm) almost that of body. Four large ocelli seen on inner rim of eye from dorsal view. Mouthparts with proximal segment of maxillary palpus equal to one-sixth the slender distal one and thin mandibles one-half as long as distal segment of palpus. Palpus and antennal segments III–VII minutely hairy and covered with small sensoria.

Metathorax: With well-defined lateral sutures outlining prescutum, which extends beyond anterior tips of the scuti; semitriangular



FIGURES 7–13.—*Myrmecolax liberiensis*, new species: 7, left hindwing; 8, abdominal segment X; 9, body and antenna in dorsal aspect; 10, hindleg; 11, mandible; 12, maxillary palpus; 13, aedeagus, lateral view. (Figs. 11–13 use 0.2 mm scale.)

scutellum slightly longer than prescutum; postlumbium thin, ovoid; postscutellum about equal to length of anterior metathoracic sclerites.

Hindwing: With 6 main veins; M_1 about three-fourths length of M_2; between R and M, 2 detached veins with slightly defined furca on anterior one.

Hindleg: Very thick femur about as long as tapered tibia. Four tarsal subsegments about equal length.

Aedeagus: Evenly tapered to single apical hook with only slight dorsal projection.

Abdominal segment X: Somewhat tapered but about as broad as long.

Female, larva, and host unknown.

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69562. One paratype male, same data, at CM.

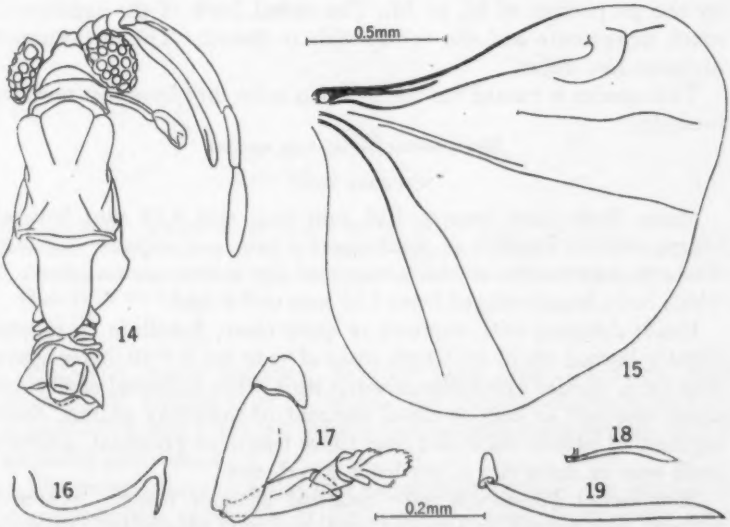
Discussion: *M. liberiensis* is decidedly smaller than any of the species previously described from Africa except *M. afurcifer* Luna de Carvalho, from which it differs in venation and terminalia of the abdomen. The evenly tapered aedeagus of *M. liberiensis*, with the apical tip rounded rather than strongly produced ventrally, differs distinctly from *M. congoensis* Silvestri, *M. leleupi* Pasteels, *M. lundensis* Luna de Carvalho, and *M. pseudolundensis* Luna de Carvalho. It is further distinct from *M. blickenstaffi* in venation and proportion of antennal segments as well as the formation of metathoracic sclerites.

Myrmecolax mano, new species

FIGURES 14–19

Male: Body brown, 1.4 mm long and 0.3 mm between wings; median breadth of hindwing 1.4 mm; expanse 3.1 mm.

Head: With fairly broad, slightly concave vertex bearing slender antenna 1.0 mm long. Flabellum of segment III reaches almost to tip of VI, which is slightly shorter than VII. Mouthparts with sabre-shaped mandibles one-half as long as distal segment of maxillary palpus.



FIGURES 14–19.—*Myrmecolax mano*, new species: 14, body and antenna in dorsal aspect; 15, right hindwing; 16, aedeagus, lateral view; 17, hindleg; 18, mandible; 19, maxillary palpus. (Figs. 16–19 use 0.2 mm scale.)

Distal segment of palpus six times length of proximal. Minute hairs and sensoria on palpus and antennal segments III–VII. Four ocelli visible on inner rim of eye from dorsal view.

Metathorax: With anterior margin of prescutum rounded, about twice width of scutal tips and projecting beyond them; scutellum not well defined, but apparently about equal in length to prescutum; postlumbium an ovoid band; postscutellum tapered to rounded tip and about two-thirds length of anterior metathoracic sclerites.

Hindwing: With 6 main veins; R very strong with slight apical furca; 2 detached veins below R, anterior one with strong furca; M_1 over one-half as long as M_2; Cu and single A present.

Hindleg: With robust femur about same length but twice as broad as tapered tibia. Four-segmented tarsus.

Aedeagus: Narrowing to one-half the thickness of base before reaching apical tip, which is sharply hooked on dorsal side and has small crestlike ventral projection. Underside slightly dished.

Abdominal segment X: Practially square.

Female, larva, and host unknown.

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69563.

Discussion: *M. mano* can be distinguished from *M. liberiensis* by venation, particularly by the strong R with a detectable furca and by the proportion of M_1 to M_2. The apical hook of the aedeagus is much more acute and the ventral side is dished. The metathoracic divisions also differ.

This species is named for the Liberian tribe that lives just north of Suakoko.

***Myrmecolax parva*, new species**

FIGURES 20–27

Male: Body dark brown, 1.45 mm long and 0.43 mm between wings; median breadth of hindwing 1.4 mm and expanse 3.2 mm. These measurements are an average of the specimens examined, in which body length ranged from 1.35 mm to 1.6 mm.

Head: Antenna with segment IV quite clear; flabellum III reaches slightly beyond tip of VI; length ratio of VI to VII is 7:10. Mouthparts with long, slender mandibles crossing each other in buccal cavity and about one-half as long as distal segment of maxillary palpus; distal segment of palpus thick and four times length of proximal. About 4 ocelli seen on inner rim of eye from dorsal view.

Metathorax: Prescutum with rounded anterior margin, posterior without well-defined suture and scuti not well separated; scutellum basically triangular with rounded apex; postlumbium wide and semilunar; postscutellum with rounded posterior tip and about as long as anterior metathoracic sclerites.

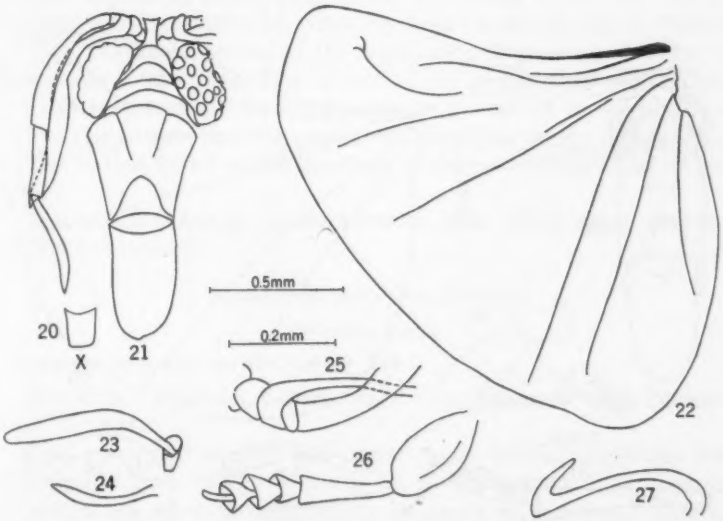
Hindwing: With 7 main veins; Sc strong; 2 detached veins below R, anterior one lightly forked; M_1 and M_2 heavy; Cu and 2 anals lighter.

Hindleg: Stout femur slightly shorter than tapered tibia; 4 bell-shaped tarsal subsegments.

Aedeagus: Slender, bearing pointed dorsal process with slight, rounded ventral projection.

Abdominal segment x: With squared posterior margin.

Female, larva, and host unknown.



FIGURES 20–27.—*Myrmecolax parva*, new species: 20, abdominal segment x; 21, body and antenna in dorsal aspect; 22, left hindwing; 23, maxillary palpus; 24, mandible; 25, right antenna, enlarged detail showing segment IV; 26, hindleg; 27, aedeagus, lateral view. (Figs. 23–27 use 0.2 mm scale.)

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69564. Six paratype males, same data, 3 at USNM and 3 at CM. Also 3 fragmentary specimens at USNM probably this species.

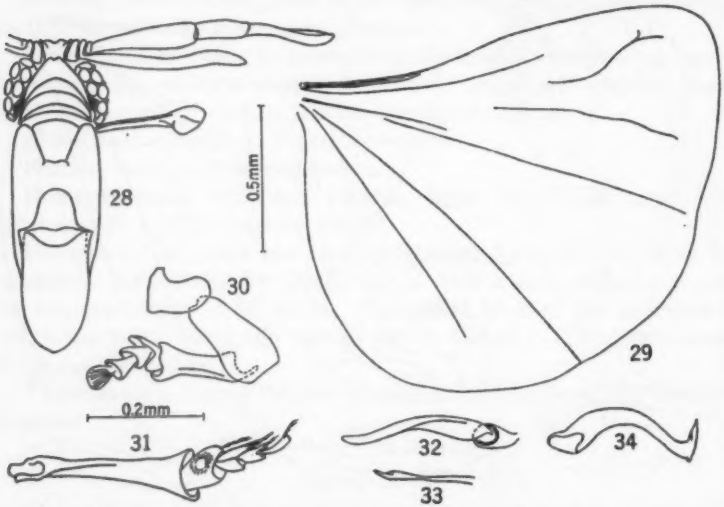
Discussion: Since no single one was entirely perfect, this description is necessarily a composite of the specimens seen. *Myrmecolax parva* can be distinguished from the preceding species by having 7 main veins, by the proportions of the maxillary palpus, the proportions of the antennal segments, and the rather squared vertex.

Myrmecolax kpelle, new species

FIGURES 28–34

Male: Body brown, 1.4 mm long and 0.35 mm wide between wings; breadth of hingwing 1.5 mm and wing expanse 3.35 mm; aedeagus 0.24 mm.

Head: Broad frontal region with slightly convex vertex. Flabellum of antennal segment III reaches tip of VI; IV very small; segment VII tapered and almost twice as long as VI. Eye with 4 ocelli on inner rim visible from dorsal view. Mouthparts with slender mandibles two-thirds length of maxillary palpus; robust maxillary palpus with



FIGURES 28–34.—*Myrmecolax kpelle*, new species: 28, body and antenna in dorsal aspect; 29, right hindwing; 30, hindleg; 31, middle leg, showing sensorium; 32, maxillary palpus; 33, mandible; 34, aedeagus, lateral view. (Figs. 30–34 use 0.2 mm scale.)

proximal segment one-third as long as distal. Palpus and antennal segments III–VII covered with tiny hairs and sensoria.

Metathorax: Prescutum keystone shaped, well defined, with rounded anterior not projecting quite as far as tips of scuti; dome-shaped scutellum about same length as precutum and separated by some distance from it; postlumbium wide, with slightly sinuate anterior margin; postscutellum equal in length to two-thirds the anterior metathoracic sclerites.

Hindwing: With 6 main veins; 2 detached below R, anterior one being lightly forked. M_1 one-half length of M_2.

Legs: Middle leg with prominent sensorium on first subsegment of tarsus. Hindleg with stout femur and rather thick tibia that appears slightly shorter. Four tarsal subsegments.

Aedeagus: Evenly tapered from stout base to apical tip that has slight crest on one side and sharply pointed process on the other.

Abdominal segment x: Not clear.

Female, larva, and host unknown.

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69565.

Discussion: *M. kpelle* differs in venation from the other species already described, particularly in the proportion of M_1 and M_2. In this respect, it resembles *M. mano* but lacks the strong, slightly forked R. The proximal segment of the maxillary palpus is much larger in proportion to the distal than is true of any of the other species, and the aedeagus remains thick for a greater portion of its length. It is interesting to note that the prominent sensorium on the second leg is similar to that found on the Brazilian *M. incautus* Oliveira and Kogan (1959).

This species is named for the Liberian tribe within whose territory Suakoko is located.

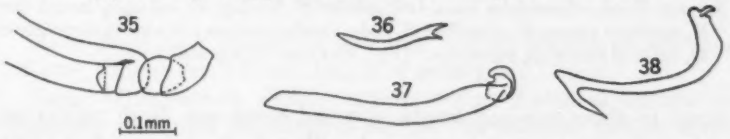
Myrmecolax lunai (Fox and Fox)

FIGURES 35–38

Afrostylops lunai Fox and Fox, 1964, p. 754.

One male. Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM.

Both Luna de Carvalho and Kogan (pers. comm.) suggested that *Afrostylops lunai* might properly be a *Myrmecolax*. The Suakoko specimen has afforded opportunity for study of additional material and the type and paratype have been critically re-examined. It was



FIGURES 35–38—*Myrmecolax lunai* (Fox and Fox): 35, enlarged detail of antenna, showing segment IV; 36, mandible; 37, maxillary palpus; 38, aedeagus, lateral view.

found that *A. lunai* possesses a short, very ill-defined fourth antennal segment that had been overlooked originally because the antennae of both specimens in the type-series are in unfavorable orientation. Accordingly, *A. lunai* is transferred to *Myrmecolax*.

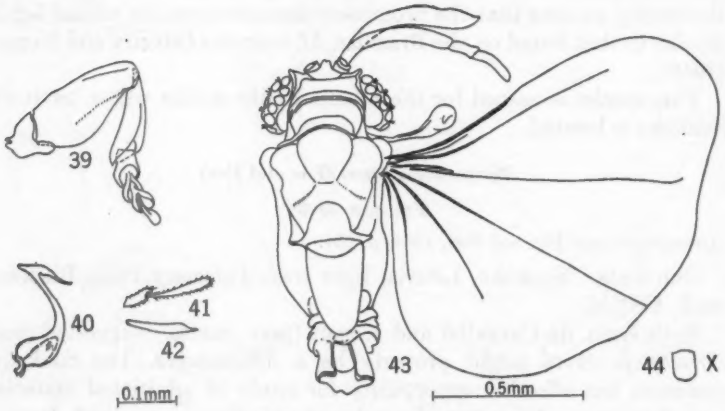
The Suakoko specimen provides, in addition, a more favorable view of the mouthparts and aedeagus.

Caenocholax bassa, new species

FIGURES 39–44

Male: Body light brown, 1.0 mm long; median breadth of hindwing 1.0 mm and expanse of wings 2.6 mm; width between eyes 0.15 mm; length of aedeagus 0.1 mm. Measurements are averages for 7 specimens studied.

Head: With narrow vertex; slender 7-segmented antenna with segment IV extremely small; flabellum of segment III reaching almost to tip of segment VI; VI two-thirds length of VII. Occipital area with pointed anterior margin extending on either side above eyes. Eye with 5 ocelli on inner row visible from dorsal view. Mouthparts with slender saber-shaped mandibles slightly longer than distal segment of maxillary palpus; maxillary palpus with large proximal segment



FIGURES 39–44.—*Caenocholax bassa*, new species: 39, hindleg; 40, aedeagus, lateral view; 41, maxillary palpus; 42, mandible; 43, body, showing antenna and wing in dorsal aspect; 44, detail of abdominal segment X. (Figs. 39–42 use 0.1 mm scale.)

equal to about one-half length of broad distal one. Both palpus and antennal segments III–VI covered with minute hairs and sensoria.

Metathorax: Prescutum with rounded anterior margin projecting beyond tips of scuti and well-defined sutures separating it at some distance from rounded tip of scutellum. Scutellum somewhat shorter than prescutum. Postlumbium wide, semilunar in shape. Postscutellum with rounded tip and slightly shorter than anterior metathoracic sclerites.

Hindwing: With 7 main veins; Sc short but distinct; no intermedials; M_1 about one-fourth length of M_2; 2 anals.

Hindleg: With thick femur slightly longer than more slender, tapered tibia. First subsegment of tarsi much shorter than sum of terminal three.

Aedeagus: Thick for about two-thirds its length, then narrowing abruptly before reaching apical hook; apex slightly rounded on ventral side with acutely pointed dorsal projection.

Abdominal segment x: About as broad as long with rounded posterior.

Female, larva, and host unknown.

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69566. Six paratype males, same data, 4 at USNM and 2 at CM. Also 3 fragmentary specimens at USNM probably this species.

Discussion: Although this species does not exactly conform in venation to stipulations in Bohart's (1951) revision of the Myrmecolicidae, all the other characters indicate its relationship, and it keys most closely to the *retrorsus* group established by Luna de Carvalho (1959).

Caenocholax bassa is much smaller (1 mm) than any other *Caenocholax*. With the exception of the big *C. golias* Luna de Carvalho (2.2 mm), the other species in the *retrorsus* group average 1.5 mm. Disregarding size, it most closely resembles *C. horberlandti* (Luna de Carvalho) and *C. boharti* (Luna de Carvalho) but can be distinguished easily from either by the proportion of the antennal segments, particularly of flabellum III, and by the shaping of both the postlumbium and the metathoracic sclerites.

This species is named for one of the largest Liberian tribes, which lives southeast of Suakoko.

Caenocholax harleyi, new species

FIGURES 45–51

Male: Body dark brown, 1.1 mm long; median breadth of hindwing 1.2 mm; wingspread 2.9 mm; length of aedeagus 0.12 mm.

Head: With narrow, slightly convex vertex. Antennal segment IV extremely small and flabellum of segment III reaching middle of VI; segment VII slightly longer than VI. Mouthparts with slender mandibles that cross within buccal cavity and are about one-third longer than thick distal portion of maxillary palpus; proximal segment of maxillary palpus not clear. Palpus and antennal segments III–VII covered with minute hairs and sensoria. Eye with 4 large ocelli visible on inner rim from dorsal view.

Metathorax: With rounded anterior margin of prescutum extending slightly beyond tips of scuti and posterior margin not well defined; scutellum clearly separated, dome shaped; postlumbium broad and

semilunar; postscutellum slightly shorter than anterior metathoracic sclerites.

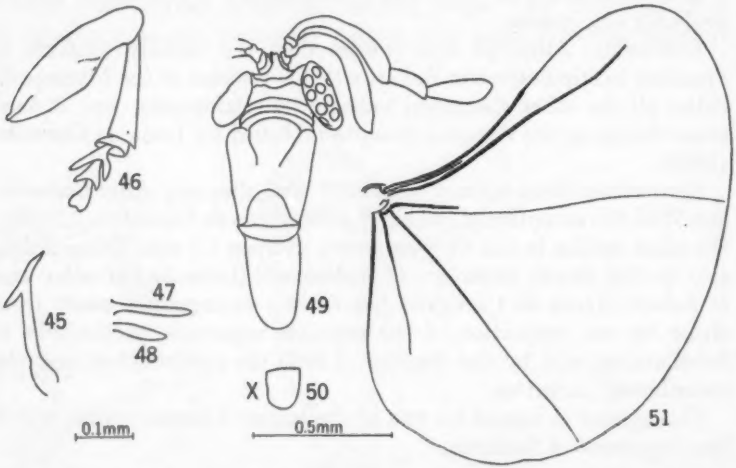
Hindwing: With 6 main veins and no intermedials; C and Sc basally coalesced; R strong; M_1 about one-fifth length of M_2; single anal.

Hindleg: Very stout femur and bell-shaped tibia of about same length; 4 tarsal subsegments with first much shorter than sum of terminal three.

Aedeagus: With bulbous base narrowing abruptly, rather than tapering, to apical tip with sharply pointed dorsal and ventral projections.

Abdominal segment x: Slightly longer than wide, with rounded tip.

Female, larva, and host unknown.



FIGURES 45–51.—*Caenocholax harleyi*, new species: 45, aedeagus, lateral view; 46, hindleg; 47, mandible; 48, distal segment of maxillary palpus; 49, body and antenna in dorsal aspect; 50, abdominal segment x; 51, right hindwing. (Figs. 45–48 use 0.1 mm scale.)

Holotype male: Suakoko, Liberia, light trap, February 1952, Blickenstaff, USNM type no. 69567.

Discussion: This species can be separated quickly from *C. bassa* by the shape of the aedeagus; further, the prescutum and scutellum are not so widely separated, the postlumbium is narrower, and the proportions of the mouthparts and antennal segments differ. Among the *retrorsus* group, *C. harleyi* most closely resembles *C. boharti* (Luna de Carvalho), but, apart from its much smaller size, antennal segments VI and VII are different in proportion, the inner margins of the apical tip of the aedeagus are slanted but not incurved, and the tibia of third leg has a very straight distal margin with one slight projection rather than being rounded.

This species is named in honor of the late Dr. George Harley, who gave over 30 years of dedicated service to Liberia as a medical missionary in Ganta.

Key to Males of Known Liberian Strepsiptera

(Detached vein is used in the same sense as inter-radio-medial vein of some authors)

1. Antenna 7-segmented with 3rd and 4th flabellate; tarsus with 5 segments and post-tarsal claws (Mengeidae). . . . . **Triozocera maxi**
   Antenna 7-segmented with only 3rd flabellate; tarsus with 4 segments and no claws 2
2. Hindwing without detached veins (*Caenocholax*) 3
   Hindwing with 1 or more detached veins (*Myrmecolax*) 4
3. Hindwing with 2 anal veins; aedeagus with prolonged bulbous base and sharp apical dorsal process; mandible sabre shaped. . . . . **Caenocholax bassa**
   Hindwing with 1 anal vein; aedeagus narrow for most of its length and having acutely pointed dorsal and ventral processes at apex; mandible evenly tapered to tip . . . . . **C. harleyi**
4. Hindwing with 7 main veins plus 2 detached veins. 5
   Hindwing with 6 main veins plus either 1 or 2 detached veins. 6
5. Hindwing with M_1 less than one-half length of M_2(2:5); aedeagus with acutely slanted apex, sharply pointed dorsal process, and slightly angular ventral projection; segment x tapered . . . . . **Myrmecolax lunai**
   Hindwing with M_1 more than one-half length of M_2; aedeagus narrow with dorsal apical process not acutely pointed; segment x rectangular. **M. parva**
6. Hindwing with single detached vein; flabellum of antennal segment III reaching one-third length of VII . . . . . **M. blickenstaffi**
   Hindwing with 2 detached veins; flabellum of antennal segment III just reaching tip of VI 7
7. Proximal third of aedeagus wide, distal two-thirds strongly tapered; tip of prescutum not reaching beyond anterior margins of scuti . . . **M. kpelle**
   Aedeagus slender, of nearly even width, slightly tapered; tip of prescutum reaching beyond anterior margins of scuti. 8
8. Apical tip of aedeagus with slender dorsal process sharply pointed and curved on inner margin, ventral process short and angular; R with furca. **M. mano**
   Apical tip of aedeagus with dorsal process broad but pointed, ventral process rounded; R without furca . . . . . **M. liberiensis**

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